No. of Printed Pages : 6

BET-014

DIPLOMA IN CIVIL ENGINEERING (DCLE(G)) / DIPLOMA IN ELECTRICAL AND MECHANICAL ENGINEERING (DEME) / DCLEVI / DMEVI / DELVI / DECVI / DCSVI / ACCLEVI / ACMEVI / ACELVI / ACECVI / ACCSVI

Term-End Examination

June, 2015

00550

BET-014 : APPLIED MECHANICS

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *from the remaining questions. Assume suitable data wherever necessary.*

1. Choose the correct answer from the given alternatives. *7×2=14*

(a) A force P of 50 N and another force Q of unknown magnitude act at 90° to each other. They are balanced by a force of 130 N. The magnitude of Q is

(i) 60 N

(ii) 80 N

(iii) 100 N

(iv) 120 N

(b) The centre of gravity of a hemisphere of radius r from its base measured along the vertical radius is

(i) $\frac{4r}{3}$

(ii) $\frac{3r}{2}$

(iii) $\frac{3r}{8}$

(iv) $\frac{4r}{7}$

(c) Area moment of inertia of a square section of side "a" about its base is

(i) $\frac{a^4}{2}$

(ii) $\frac{a^4}{3}$

(iii) $\frac{a^4}{4}$

(iv) $\frac{a^4}{5}$

(d) The maximum value of the horizontal range for a projectile projected with a velocity of 98 m/sec is

(i) 98 m

(ii) 490 m

(iii) 980 m

(iv) 1960 m

(e) Relation between tangential velocity "u_t" and angular velocity "ω" of a body in circular motion is

(i) $u_t = r\,\omega$

(ii) $\omega = u_t\, r$

(iii) $r = u_t\, \omega$

(iv) None of the above

(f) Which of the following is a scalar quantity ?

(i) Energy

(ii) Momentum

(iii) Torque

(iv) Impulse

(g) A system of coplanar forces acting on a rigid body can be reduced to

(i) one force only

(ii) one couple only

(iii) one force and one couple only

(iv) None of the above

2. (a) Four forces are acting at O as shown in Figure 1. Find the resultant in magnitude and direction by using method of resolution of forces. *10*

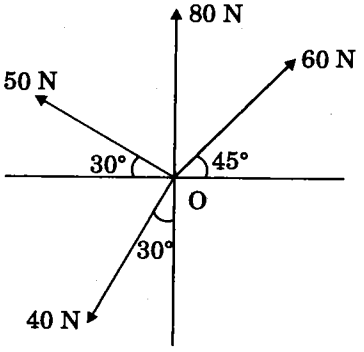

Figure 1

(b) State triangle law of forces and polygon law of forces. *4*

3. Find the moment of inertia of the hollow section shown in Figure 2 about its centroidal axis XOX. *14*

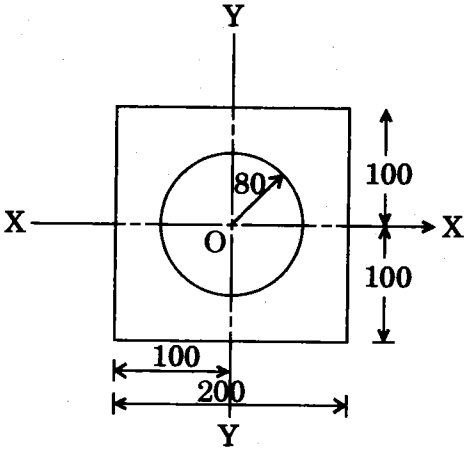

Figure 2

4. List the various methods of analyzing a truss. Find the forces in Warren truss by any method from Figure 3. *14*

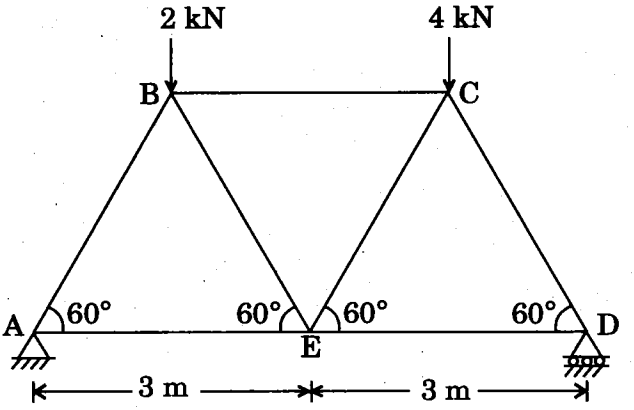

Figure 3

5. A body weighing 400 N is resting on an inclined plane making an angle of 30° with the horizontal. A force P is applied parallel to and up the inclined plane. Find the least value of P when the body is just on the point of movement moving up. Consider coefficient of friction is 0·3. *14*

6. A wheel of 1 m diameter is mounted on a shaft between two bearings. The wheel is subjected to constant moment of 100 Nm at the rim for 10 minutes to attain a speed of 120 rpm. Calculate the following : *14*

   (a) The number of revolutions made during this period

   (b) The angular acceleration, the tangential acceleration and centripetal acceleration

   (c) The work done in rotating the wheel during this time

7. Body A is thrown with a velocity of 10 m/s at an angle of 60° to the horizontal. If another body B is thrown at an angle of 45° to the horizontal, find the velocity, if it has the same (a) horizontal range, (b) maximum height, and (c) time of flight, as the body A. *14*
